A new regularization method for a parameter identification problem in a non-linear partial differential equation

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Abstract

We consider a parameter identification problem associated with a quasi-linear elliptic Neumann boundary value problem involving a parameter function $a(\cdot)$ and the solution $u(\cdot)$, where the problem is to identify $a(\cdot)$ on an interval $I := g(\Gamma)$ from the knowledge of the solution $u(\cdot)$ as g on Γ, where Γ is a given curve on the boundary of the domain $\Omega \subseteq \mathbb{R}^3$ of the problem and g is a continuous function. The inverse problem is formulated as a problem of solving an operator equation involving a compact operator depending on the data, and for obtaining stable approximate solutions under noisy data, a new regularization method is considered. The derived error estimates are similar to, and in certain cases better than, the classical Tikhonov regularization considered in the literature in the recent past.

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